

**ABSTRACT OF THE DISCLOSURE**

The present invention provides apparatuses for measuring cell membrane resistance, conductance, potential, and capacitance, which can be used to determine cellular electrical activity. More specifically, the present invention provides automated apparatuses that are designed for high-throughput analysis of various compounds, ligands, and cell processes that modulate cellular electrical properties (e.g., cell membrane conditions). Such automated apparatuses can be used for the precise determination of ion channel activity, and for the rapid identification of compounds, ligands, or processes that alter this activity. The present invention also provides methods for measuring cellular electrical properties utilizing the apparatuses provided herein.